♀. *Subimago:* Total length, 16·5 mm.; forewing, 19 mm.; hindwing, 7 mm.; expanse, 40 mm. Generally resembling the same stage in *I. hudsoni* McL., but with the following differences: The whole body, legs, and appendages are a dull earthy greyish-brown; the forewing has the ground-colour pale-greyish tinged with yellowish, the pale basal patch pale orange, the costal band dull purplish-brown, and the two oblique clouds a medium fuscous and more sharply angulated below R_1 than is the case in *I. hudsoni* McL.; the hindwing is dull purplish-brown, paler towards the base and posterior margin. (In *I. hudsoni* McL. the hindwing is pale-greyish, with two oblique clouds of medium fuscous.) Ventral valve entire, not bilobed as in *I. hudsoni* McL. (fig. 5). Cerci 8 mm.; appendix dorsalis 6·5 mm. long.

Types.—Holotype male imago and allotype female subimago in Cawthron Institute collection.

Locality.—Maitai River, Nelson; taken by Mr. A. Philpott on 29th December, 1920. No further specimens have so far been found, but the larva was taken in the following January by Mr. Philpott and myself, by scraping away the loose rubbly bank of the stream. It seems probable that this species may be found widely distributed throughout the South Island if searched for.

Art. 21.—*On some New Zealand Cave Orthoptera.*

By L. Chopard, D.Sc.

Communicated by H. Hamilton.

[*Read before the Wellington Philosophical Society, 7th June, 1921; received by Editor, 9th June, 1921; issued separately, 17th February, 1923.*]

Since the appearance of Hutton's important papers on the Stenopelmatidae of New Zealand nothing has been published on the Orthoptera living in the limestone caves of New Zealand.* All, therefore, that this author said in his first paper concerning those insects can still be considered as true. Speaking of the various species of Rhaphidophorinae found in caves, Hutton said, "The cave wetas are in the greatest confusion, and we do not know whether there are six or only two species."

This confusion is due to the fact that most of those species are known from a few examples only, and have generally been quite insufficiently described. Dr. J. Allan Thomson, Director of the Dominion Museum, Wellington, having kindly sent me for examination a small number of insects recently collected, I have had available a comparatively large amount of material, including fourteen specimens, belonging to three species, from the British Museum, very kindly communicated by Dr. Urarof. Besides this, Professor R. Ebner was recently good enough to send me the types of Rhaphidophorinae of Brunner's collection, among which I found *Neonetus*

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* F. W. Hutton, The Stenopelmatidae of New Zealand, *Trans. N.Z. Inst.*, vol. 29, pp. 208–42, pl. 12–13, 1897; and Notes on some New Zealand Orthoptera, *Trans. N.Z. Inst.*, vol. 32, pp. 19–21, 1900.

variegatus Br., an interesting, insufficiently known species, which, although living outside caves, is very nearly allied to the true cavernicolous *Pleioplectron*.

In spite of these favourable conditions, I have not been able to consider all the species known as cave-dwellers in New Zealand, and therefore I cannot give a full synopsis of them. I shall endeavour to give as complete a description as possible of all the forms I have before me, and call the attention of the New Zealand entomologists to the fact that many particulars are still wanting on this interesting fauna.

Genus PACHYRHAMMA Br.

As far as I am aware, no representative of this remarkable genus has until now been found in the South Island. I do not think there is more than one species in the North Island, although local varieties may possibly exist.

Pachyrhamma fascifer Walk.

Kaiparora (Wellington), 16th March, 1917; one male, one female. Karori (Wellington), (cave), 1916; two females, two males; one young male, two young females.

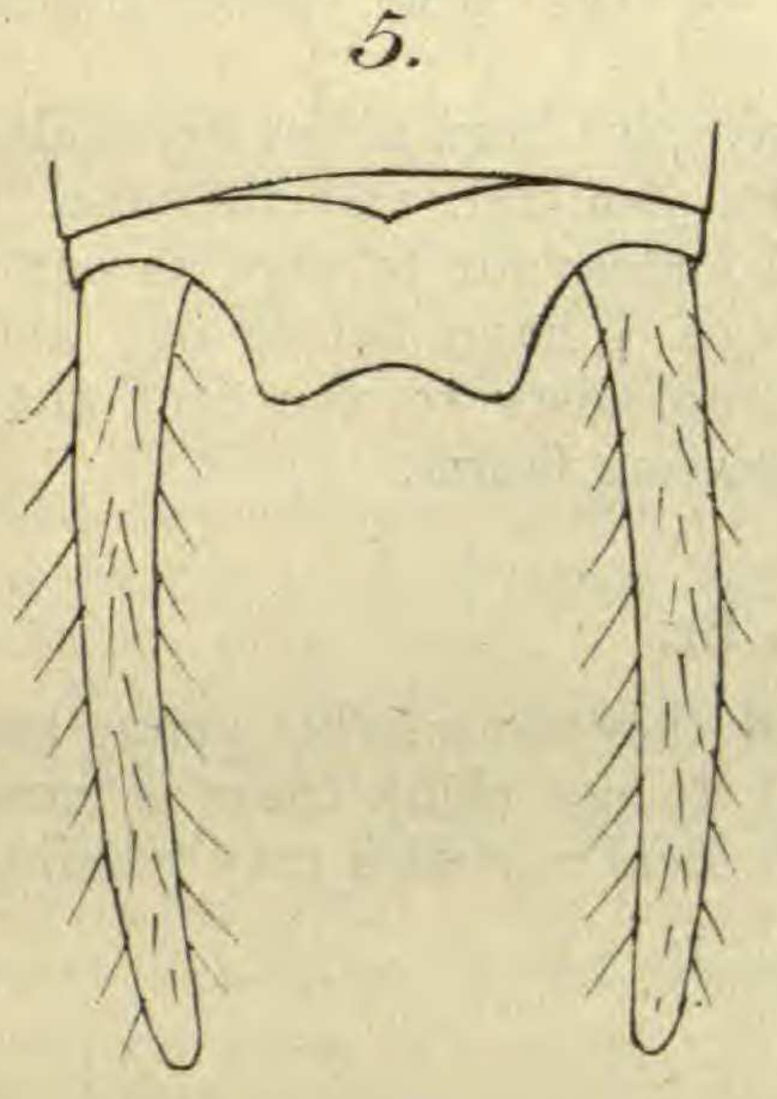
A good redescription of this species has been given by Hutton,* to which need only be added that the subgenital plate of the female is small, triangular, presenting a wide semicircular notch at apex, the ovipositor rather longer than the body, almost straight, its inferior valves showing before the apex 10 small transverse ridges.

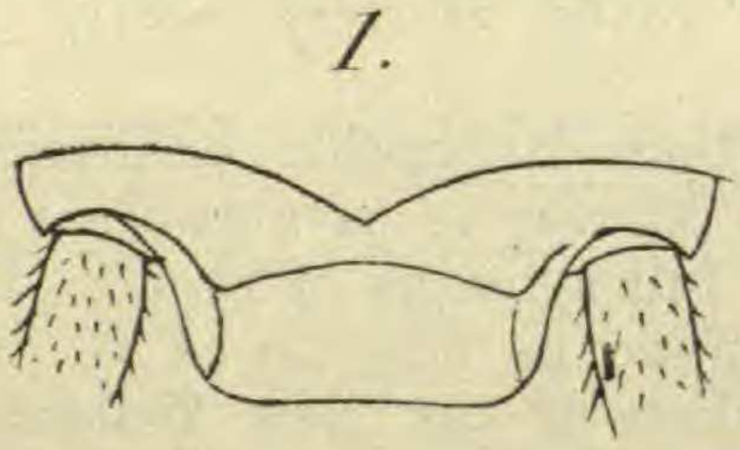
The number of spines of the legs is somewhat variable, as shown by the following table :—

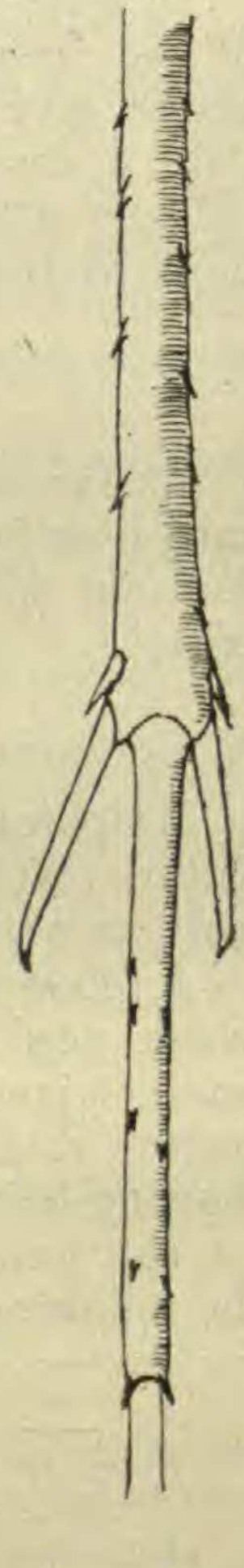
		Fore Fem.	Fore Tib.	Mid. Fem.	Mid. Tib.		Post. Fem.	Post. Tib.
					Above.	Beneath		
♂	Int. marg. ..	6—4	4—4	3—4	6—5	4—4	8—10	32—30
	Ext. marg. ..	0—0	4—4	3—3	4—4	4—4	4— 4	34—33
♀	Int. marg. ..	4—4	4—4	3—3	4—4	4—4	11—11	29—31
	Ext. marg. ..	0—0	4—4	1—2	3—3	4—4	4— 4	35—36
♀	Int. marg. ..	4—6	4—4	2—1	3—5	4—4	8—10	28—32
	Ext. marg. ..	0—0	4—4	2—0	2—3	3—3	5— 4	34—37
♂	Int. marg. ..	5—5	4—4	2—2	4—4	4—4	8— 8	27—28
	Ext. marg. ..	0—0	4—4	2—1	3—3	4—4	3— 4	33—32
♂	Int. marg. ..	7—7	4—4	2—3	4—4	4—4	8—10	35—28
	Ext. marg. ..	0—0	4—4	2—2	3—3	4—4	3— 4	40—38
♂	Int. marg. ..	4—?	4—?	4—4	3—4	4—4	8— 9	28—29
	Ext. marg. ..	0—?	4—?	2—3	5—3	4—4	4— 5	32—33

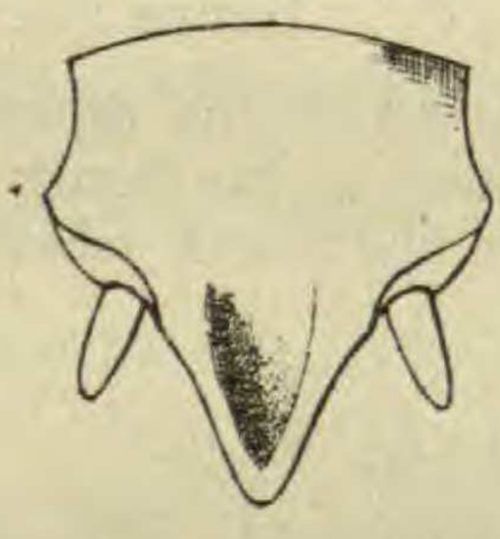
The high specialization of the antennae of the males in this species proves somewhat different according to the specimens examined. In some of them the joints are cylindrical and smooth to about the sixtieth; they begin then to show a small apical tooth beneath till about the hundredth joint. This tooth becomes stronger but irregular towards the apex of the differentiated region, which region ceases abruptly, the joints again becoming cylindrical and very hairy. In others the joints are differentiated from the twentieth on, showing alternately small and

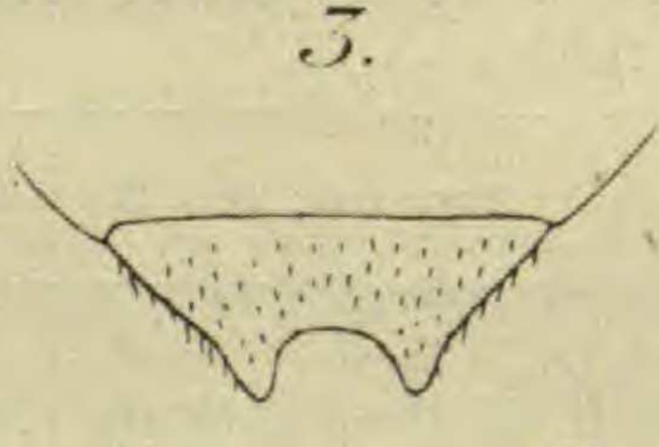
* *Loc. cit.*, vol. 29, p. 231.











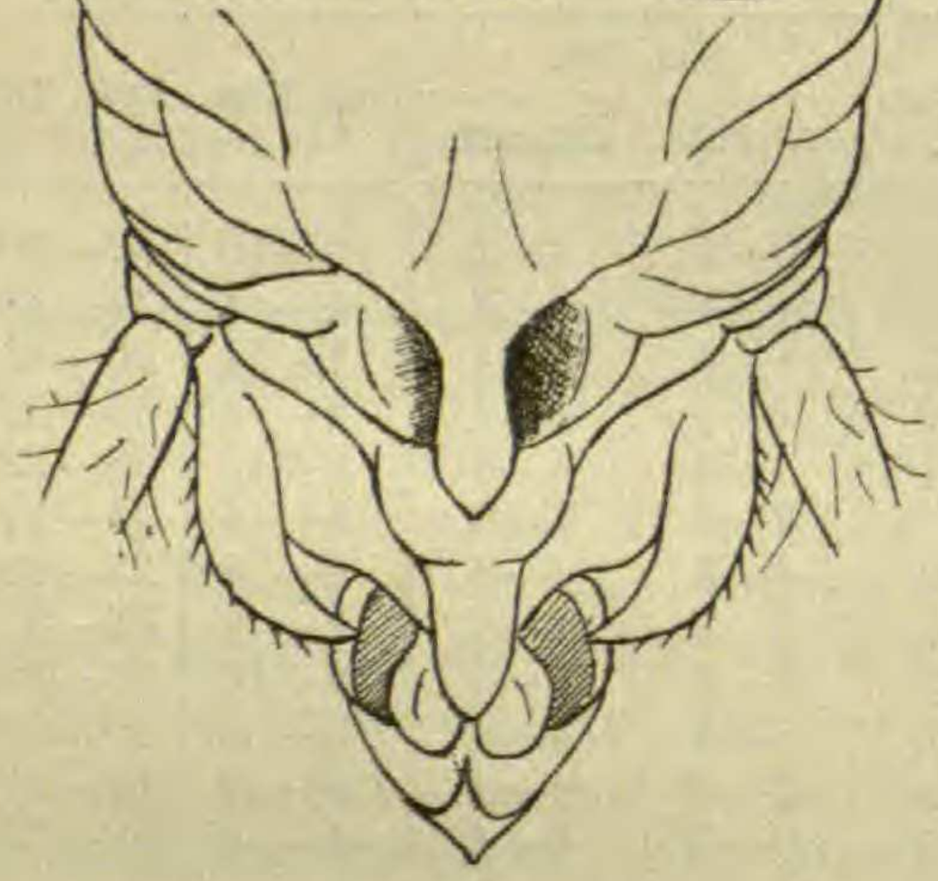


Fig. 1.—*Pachyrhamma fascifer* Walk. : supra-anal plate of male, × 7.
Fig. 2.—*Pachyrhamma fascifer* Walk. : supra-anal plate of female, × 7.
Fig. 3.—*Pachyrhamma fascifer* Walk. : subgenital plate of female, × 7.
Fig. 4.—*Pleioplectron cavernae* Hutt. : frontal rostrum, × 14.
Fig. 5.—*Pleioplectron cavernae* Hutt. : supra-anal plate and cerci of male, × 7.
Fig. 6.—*Pleioplectron cavernae* Hutt. : apical subgenital plate of male × 7.
Fig. 7.—*Pleioplectron cavernae* Hutt. : apex of left posterior tibia and metatarsus, × 7.
Fig. 8.—*Pleioplectron cavernae* Hutt. : external spurs of posterior tibiae, × 14.
Fig. 9.—*Weta thomsoni* n. sp. : apex of abdomen of male (inferior face), × 14.

large teeth until the seventieth or eightieth joint, where the antennae become cylindrical and hairy as stated above. In immature specimens the antennae show no differentiation whatever, appearing very much like those of the female, but rather thicker at base.

These differences seem quite individual; whilst another character may be considered as a real male dimorphism, as formerly related by Griffin among Stenopelmatids.* The two adult males found at Karori present a rather bigger head, with larger, strongly-notched eyes, and antennae thicker at base. They really seem somewhat different from the males of Kaiparora, but, both unfortunately lacking the apex of the abdomen, it is impossible to state whether they differ in other characters.

It may be added that *P. fascifer* does not seem to be exclusively cavernicolous, as I received a female from Mana Island which has certainly been caught outside of caves. Very likely the species has a mode of living similar to that of our European *Dolichopoda* or *Troglophilus*.

Genus PLEIOPLECTRON Hutt.

Pleioplectron cavernae Hutt.

Cave near Taupo, F. W. Hutton, 18th February, 1899; one male, one immature female (British Museum).

A few peculiarities must be added to Hutton's description of this species.

Frontal rostrum narrow, compressed, deeply and very narrowly notched at apex; palpi almost white, maxillary palpi not very long, with fourth joint equal to third, fifth once and a half as long as fourth (length of the three joints, 2 mm., 2–2 mm., 5–3 mm., 5 mm.). Anterior femora without apical spines or with a very small internal one; tibiae hairy, with 2 apical spurs and 3 spines on each inferior margin. Middle femora with a short external apical spine and a rather long, movable, internal one; tibiae with 4 apical spurs, 4 spines above (3 external, 1 internal), and 3 on each inferior margin. Posterior femora armed with a small genicular internal spine, 6–7 rather strong ones on the inferior internal margin, and only 2 small ones near the apex of the external margin; tibiae cylindrical and glabrous, presenting a brown ring near the base, and armed on each superior margin with 25–30 very small, brown, widely-separated, irregular spines, the last of which is apical; spurs short, the external a little longer than the internal ones, inferior ones very short, spiniform, intermediate half as long as the superior ones. Tarsi long, almost glabrous, very little compressed beneath, rounded above, first and second joints with 2 apical spines; metatarsus as long as other joints together, armed with 4–6 small spines, on two rows, besides the 2 apical ones.

Tenth tergite of male large with its posterior margin wide, weakly concave, rounded angles; anal valves very small; subgenital plate large, presenting a basal part wide and little convex, and an apical one projecting between the styles, triangular, subacute at apex, furrowed beneath; styles very short, cylindrical, inserted about on the middle of the lateral margins of the plate. Cerci rather long, straight, almost as thick at apex as at base.

I have seen no adult female, but the subgenital plate of the immature one shows a rounded notch at the apex.

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* Stenopelmatids in F. SARAGIN et I. ROUX, *Nova Caledonia, Zoologie*, I, 4, p. 296.

If it is not an accidental disposition of the specimen here described, this species shows a very remarkable character in the apical spurs of the posterior tibiae; I think it is quite an exception in the whole group of the Rhaphidophorinae to have the internal spurs shorter than the external ones. If this feature be confirmed by examination of other specimens I should not hesitate to consider it as of generic value; but it seems so extraordinary that I cannot decide the question, chiefly from the fact that only one leg of the two specimens I have seen was in good condition for study.

I cannot follow Hutton's conclusions as to the synonymy of this species with *Pachyrhamma edwardsii* Br. (*non* Scudd). Brunner's description of the latter species runs as follows: "Femora antica subtus inermia, postica longissima, gracillima, subtus margine interno spinis 4–6 longioribus, margine externo spinulis minimis confertissimis armata." This character is in absolute contradiction with what we observe and what Hutton himself has described in *P. cavernae*.

Genus Weta* n. gen.

Frontal rostrum very narrow, truncated and feebly notched at apex; antennae very close at their base. Lateral lobes of pronotum only moderately high, their inferior margin straight. Cerci rather short and thick, little acute at apex. Anterior and middle femora armed with 2 acute movable spines, fore and middle tibiae with 4 apical spurs; posterior femora rather short, unarmed beneath, bearing a short internal genicular spine; posterior tibiae rather pubescent, armed with about 35 irregular spines; 4 apical spurs only, of which the supero-internal are longer than half the metatarsus. Male: Seventh, eighth, and ninth abdominal sternites partially united, and with the genital valves form a very remarkable genital complex. Female: subgenital plate small, ovipositor rather long, almost straight.

Genotype.—Weta thomsoni n. sp.

This genus takes place between *Miotopus* Hutt. and *Neonetus* Br., having movable acicular spines at apex of fore and middle femora and 4 apical tibial spurs; but the most remarkable feature consists in the form of male genitalia, which alone would need the creation of a new genus for the species.

Weta thomsoni n. sp.

♂. Medium-sized, rather slender species, with shining teguments, rather scarce pubescence, coloration yellowish, marbled with brown.

Head as large as the pronotum, yellowish; occiput convex, rather long, presenting a fine brown line behind each eye; frontal rostrum brown, very narrow, truncated and little notched at apex, furrowed on its whole length; two very neat ocellar spots at its base. Face yellow, with golden rather abundant pubescence; a rather large, badly defined brown spot beneath each antenna. Eyes small, black, situated rather high behind the antennae. Mouth-parts short; maxillae with 2 apical and very slender ante-apical teeth; palpi whitish, with first joint short, second rather long, third long and rather thick, fourth equal to third, fifth long, little curved

* Maori name of the Rhaphidophorinae.

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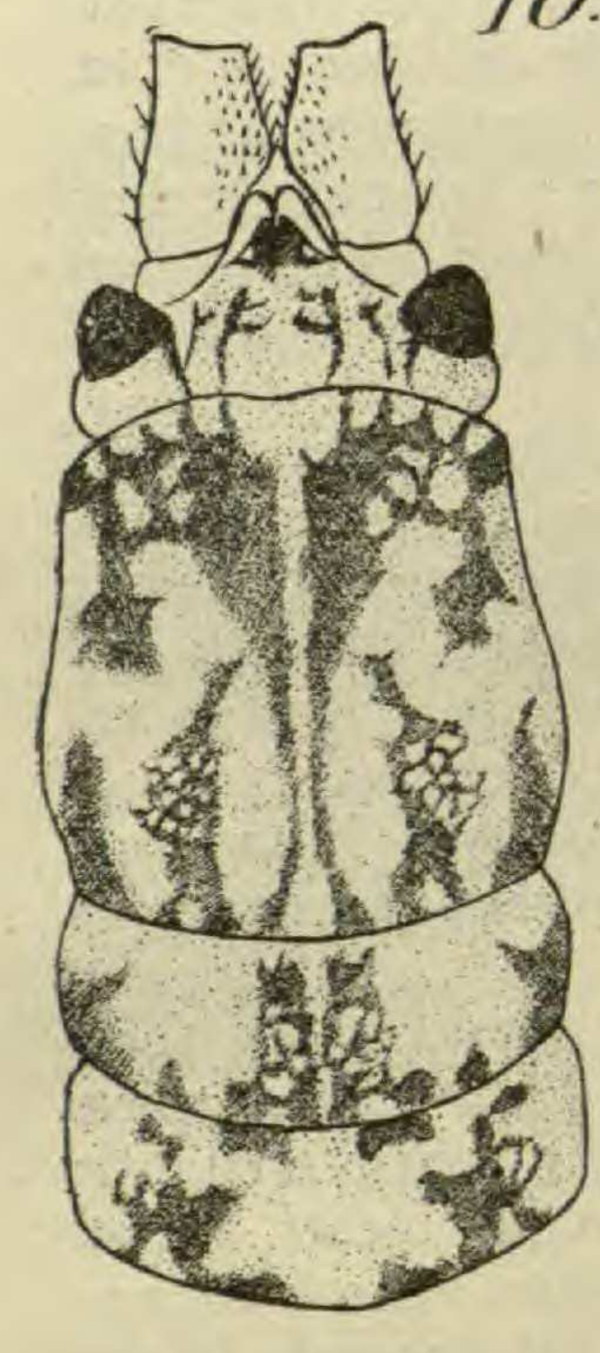

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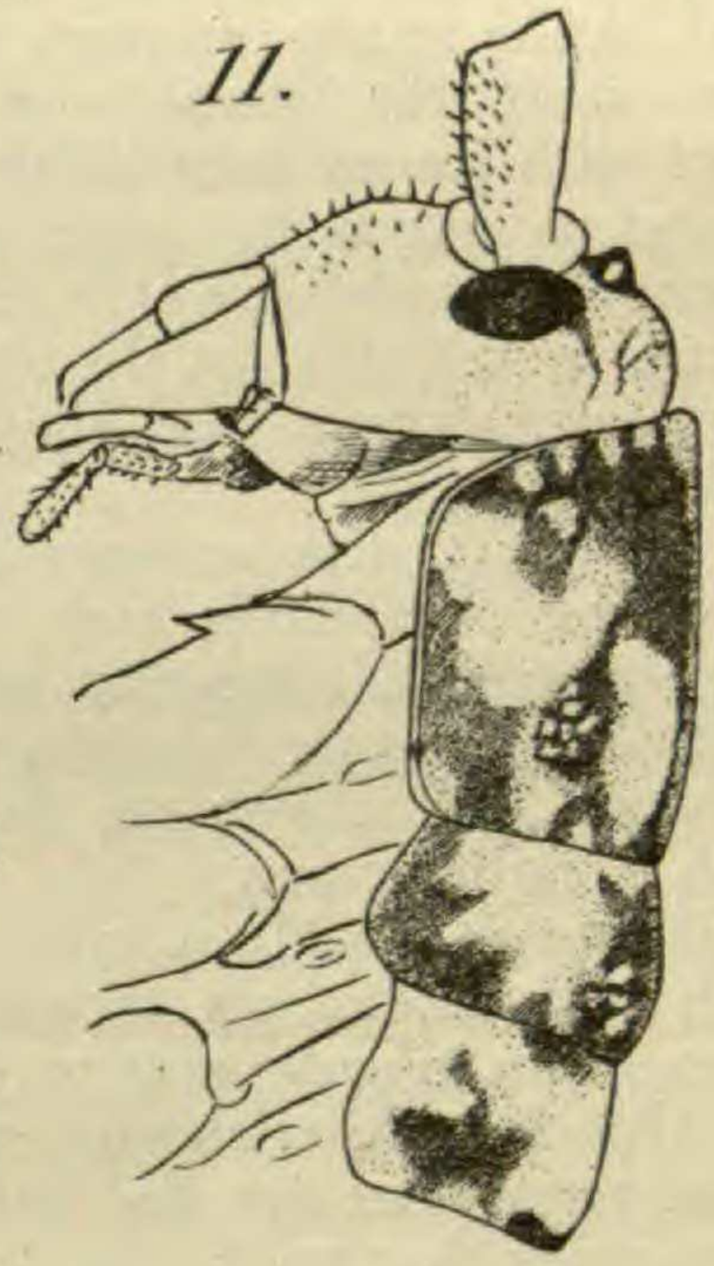

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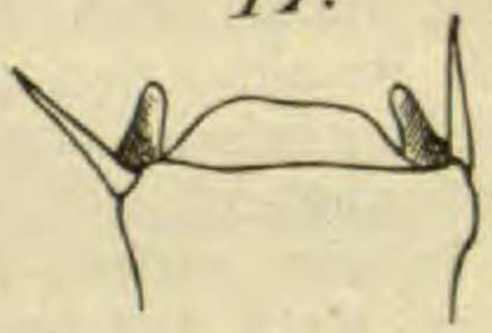

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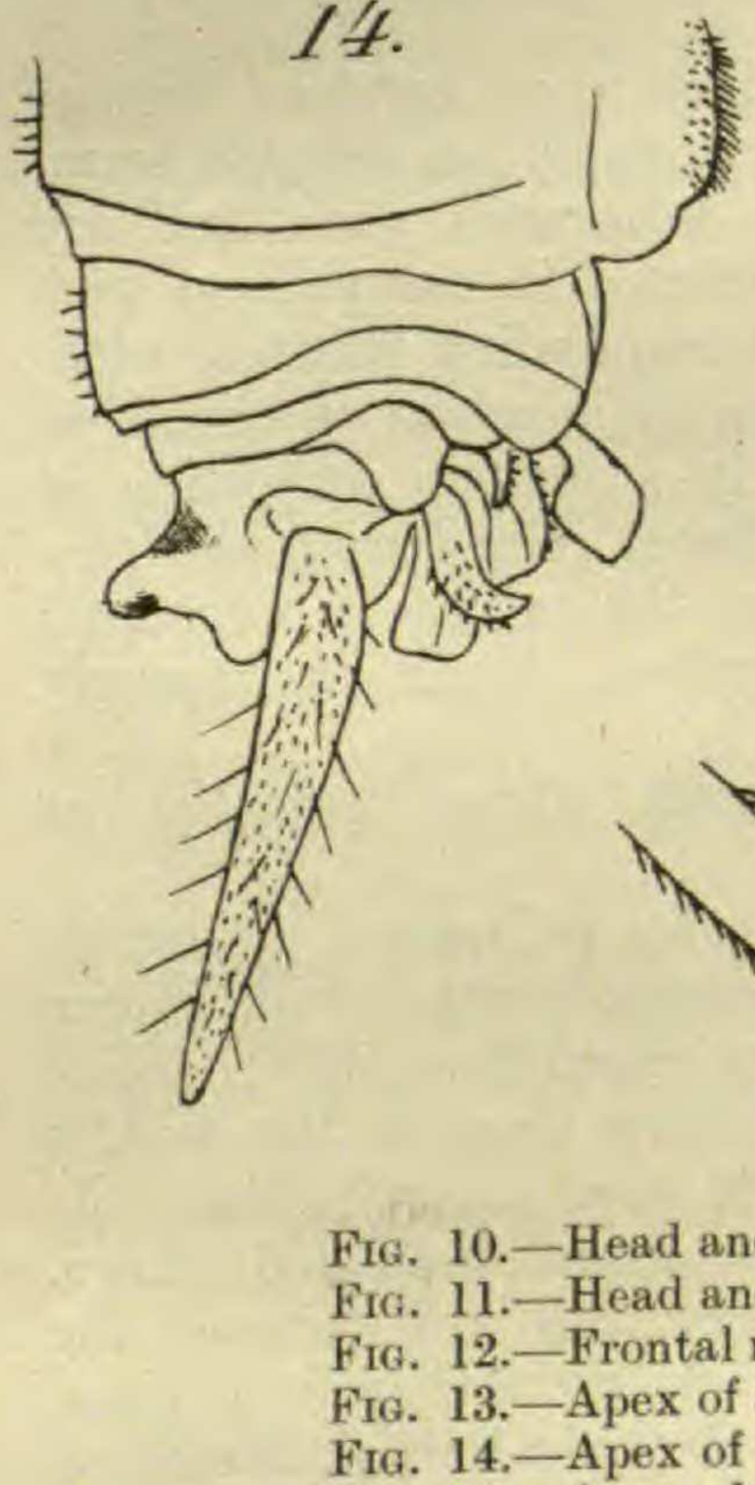

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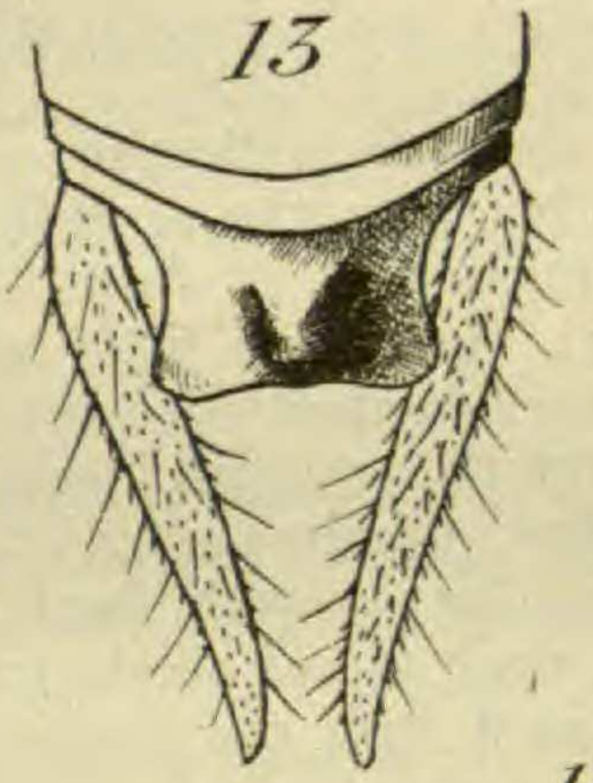

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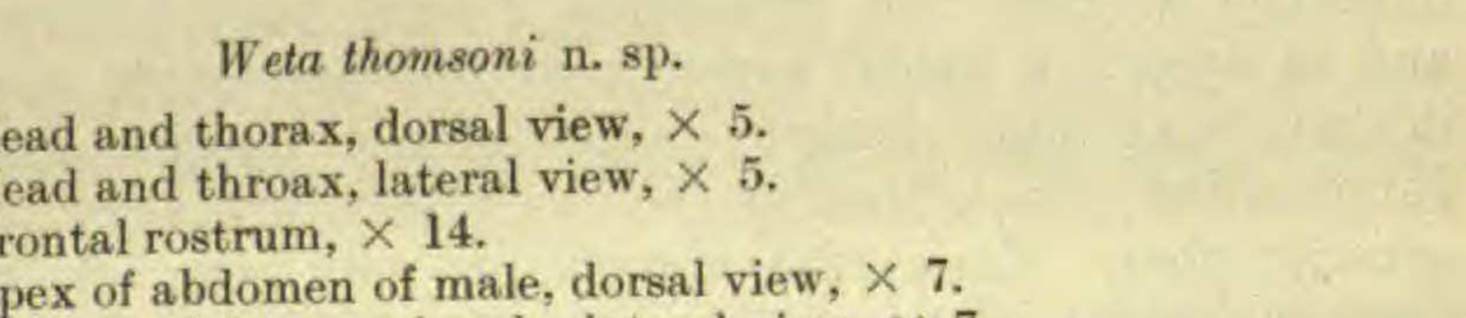

Weta thomsoni n. sp.

FIG. 10.—Head and thorax, dorsal view, × 5.
FIG. 11.—Head and throax, lateral view, × 5.
FIG. 12.—Frontal rostrum, × 14.
FIG. 13.—Apex of abdomen of male, dorsal view, × 7.
FIG. 14.—Apex of abdomen of male, lateral view, × 7.
FIG. 15.—Apex of abdomen of female, lateral view, × 3.
FIG. 16.—Apex of ovipositor, × 7.
FIG. 17.—Apex of fore femur, × 14.
FIG. 18.—Apex of posterior tibia and tarsus (internal face), × 6.

(length of the three last joints, 2 mm., 5–2 mm., 5–4 mm.). Labium with basilar square, mentum very short, palpiger scarcely longer than wide, lobes short, the internal very acute, the external ones a little truncated ; palpi with second joint rather long, thick, third a little enlarged at apex, almost as long as the other two together. Antennae contiguous at base, rufous almost glabrous at base, brown, pubescent at apex ; antennae-sockets touching each other on the median line, first joint very large, wider at base than apex, second joint short but rather thick, the following cylindrical in both sexes.

Pronotum with anterior and posterior margins little convex, lateral lobes only moderately high, with inferior margin straight, anterior angle very rounded ; coloration yellowish-rufous with a large fuscous median spot, extending on the sides forwards ; median line light ; on each side a brown spot is seen on the lateral lobes and backwards. Mesonotum with posterior margin little convex, lateral lobes very moderately high, their margin weakly convex ; colour as on the pronotum. Metanotum with posterior margin straight, lateral lobes almost absent, presenting a large brown irregular spot on each side.

Abdomen rather slender, each tergite adorned with brown spots, these being more extensive and darker on the first tergites than on the apical ones, where they are limited to the posterior margin ; this margin is slightly concave on the tergites 6 to 8, the ninth strongly convex ; tenth tergite large, mixed with the supra-anal valve, forming a plate almost square, with its sides decidedly concave, bearing a big rounded tubercle in the middle ; inferior anal valves small, brown, with inferior face ending in an acute angle.

Inferior surface of abdomen yellowish, pubescent ; sternites regular to the sixth, but presenting from the seventh extremely remarkable formation. These three sternites join to form the subgenital plate and are partially joined together ; they are a little contracted in comparison with the preceding, and in direct contact with the corresponding tergites, without any connecting membrane ; seventh sternite a little raised on the sides, presenting a slight median prominence ending in a process projecting in the form of a compressed disc ; eighth short, almost joined with the preceding and presenting 2 small apical points under the process in question ; ninth sternite wholly joined with the genital valves, which are strongly chitinized ; no styli.

Cerci rather short and thick, a little curved, almost rounded at apex.

Anterior and middle legs ringed with brown, feebly pubescent. Anterior coxae armed with a short strong spine ; femora adorned with 3 wide brown rings and armed with 2 apical rather short but movable spines ; tibiae darkened at base and presenting 2 very large brown rings in the middle and at apex ; 4 apical spurs, very fine and acute, the superior short, the inferior ones much longer ; each inferior margin armed with 2–3 spines. Intermediate legs showing the same ornamentation and armature as the anterior ones. Tarsi with metatarsus very long, chiefly the anterior ones, presenting beneath two rows of small spinules to the apical third, carinated from there to the apex, second and third joints carinated beneath Posterior femora rather short, enlarged at base, unarmed beneath, present ing a small genicular internal spine ; tibiae longer than the femora, armed above on each margin with about 35 somewhat irregular spines, very small and contiguous at base, becoming a little longer and more remote towards

the apex; in the middle of the tibiae the spines are disposed in short series, as shown by the following formulae:—

(11—3—2—3—4—2—2—3—2—2—1—1—1—1—1 = 39.
(11—4—3—2—2—1—1—2—1—2—1—1—2—1—1—1 = 36.

Only 4 apical spurs, the inferior not half as long as the superior ones, the latter very long, extending over the half of the metatarsus; this (the metatarsus) is armed above with two rows of 4 to 6 small spines, the first of which is rather distant from the others, the pair nearer the apex the stronger; beneath it bears two rows of very small spinules almost to the apex; second joint armed above with 3–4 spines on each margin. The posterior legs are rather pubescent.

♀. In general shape and colour similar to the male; supra-anal valve smaller, quadrangular, somewhat notched at apex, presenting a slight median elevation; subgenital plate very small, almost hidden between the seventh sternite and the base of ovipositor, rounded or little notched at apex. Cerci as in male but slightly more acute at apex. Ovipositor moderately long, almost straight, little enlarged at base, curved and acuminate at apex; inferior valves with 7 rather strong denticulations, superior ones longitudinally striated outside, acute at apex.

Length of body, ♂ 23 mm., ♀ 18 mm.; pronotum, ♂ 5 mm., ♀ 4·5 mm.; anterior femora, 9·5 mm.; anterior tibiae, 9·5 mm.; internal femora, 9·5 mm.; internal tibiae, 9·5 mm.; posterior femora, 15 mm.; posterior tibia, 19 mm.; posterior tarsus, 9 mm.; posterior metatarsus, 4·7 mm.; superior internal spur, 3 mm.; cerci, 3·6 mm.; ovipositor, 10 mm.

I take pleasure in naming this species in honour of Dr. J. Allan Thomson.

Types.—One male, one female, from limestone cave, Opihi River, near Raincliff, South Canterbury, 4th May, 1917.

Co-types.—Male and female, same locality.

Genus NEONETUS Br.

This genus was established by Brunner von Wattenwyl for a small species which the said author described so briefly that it was quite impossible to recognize it when a second species of the genus was discovered subsequently. For that reason Hutton thought it best to select the commonest species as type of the genus, and consequently selected *N. variegatus* Br. As I stated, I had the opportunity of examining Brunner's types, and I found that his *variegatus* was quite different from what Hutton had thought it, and was much more closely related to *pilosus* Hutt.; the form of the subgenital plate of the male seems very comparable in both species, but *variegatus* does not show the abundant hair-clothing given by Hutton as characteristic of his *pilosus*. A full redescription of *N. variegatus* Br. seems therefore necessary.

Neonetus variegatus Br.

Neonetus variegatus Brunner, 1888, *Verh. zool. bot. Ges. Wien*, xxviii, p. 300, pl. 7, fig. 27 (*non* Hutton, 1897).

Rather small species, with a testaceous-brown coloration marbled with numerous light, dark-brown-circled spots; pubescence rather scarce. Head small, rounded; frontal rostrum very narrow, compressed, forming two small tubercules, little acute, truncated, and feebly divided at apex, deeply furrowed above; face yellowish with a brown spot beneath each eye and a wide brown band on each side from the antennal socket to

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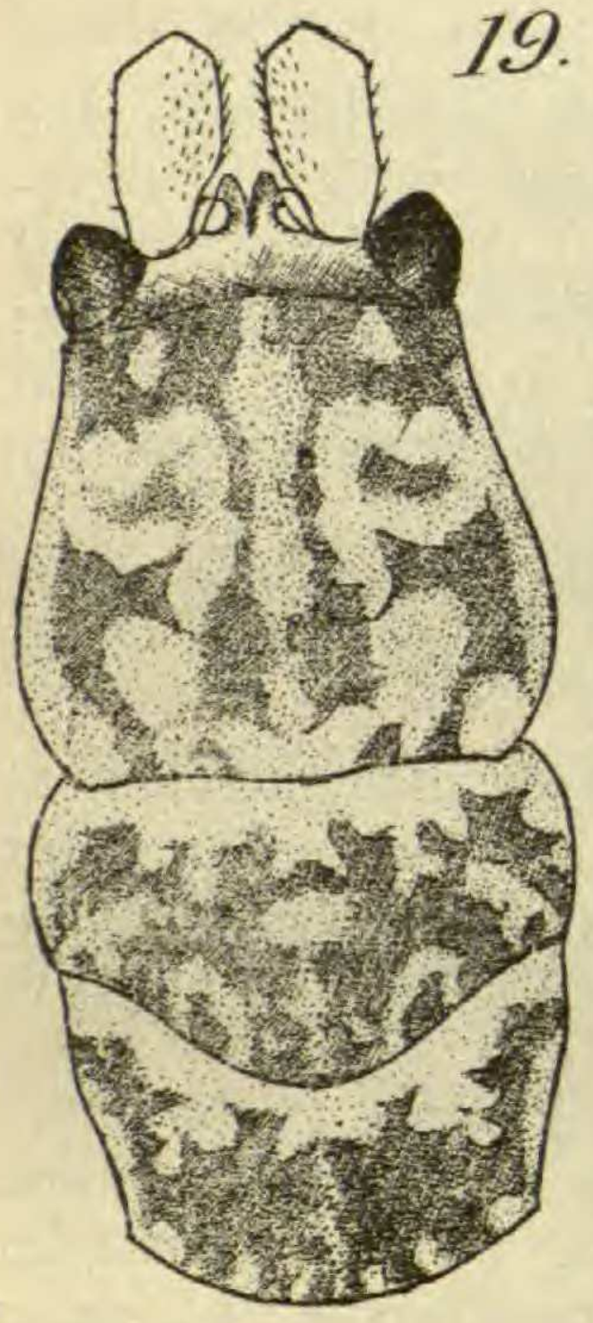

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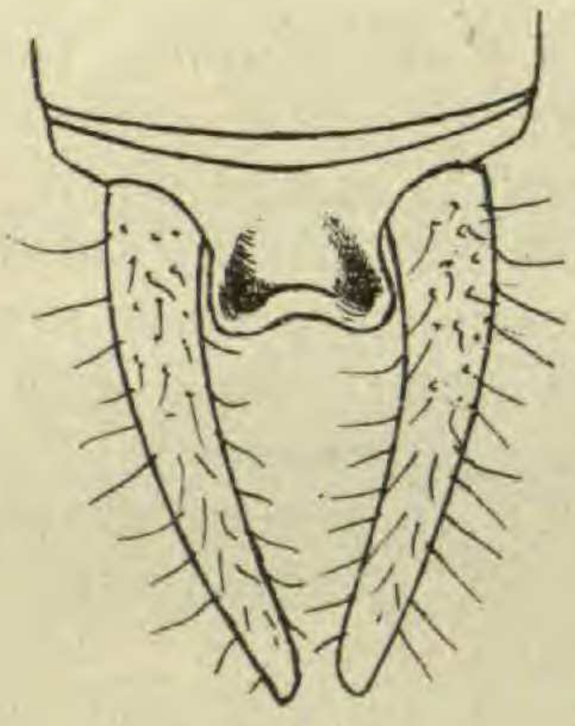

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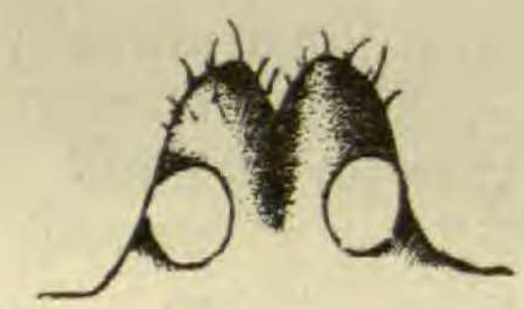

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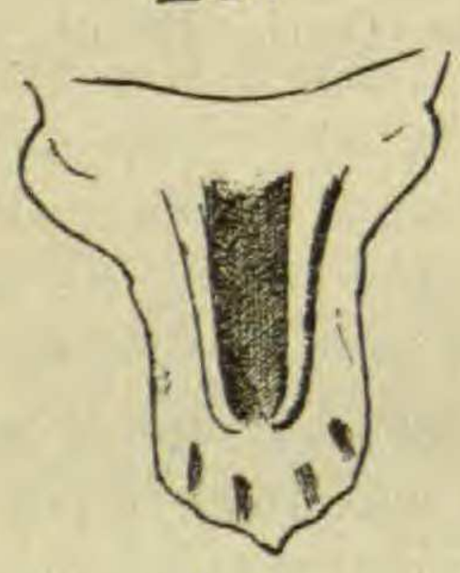

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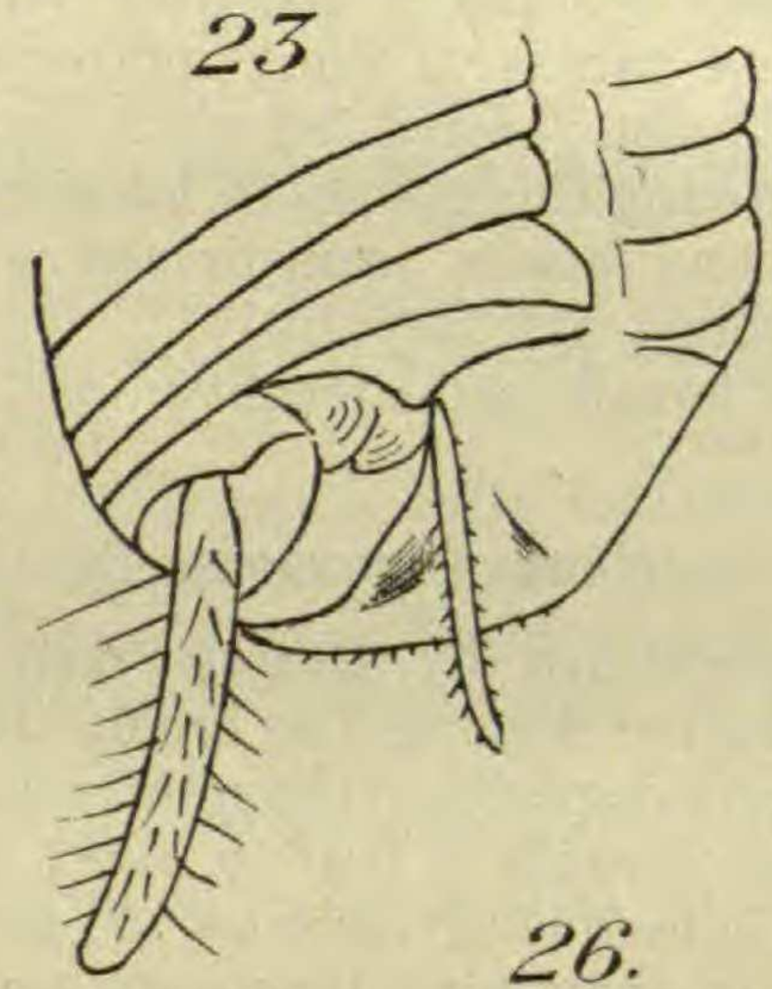

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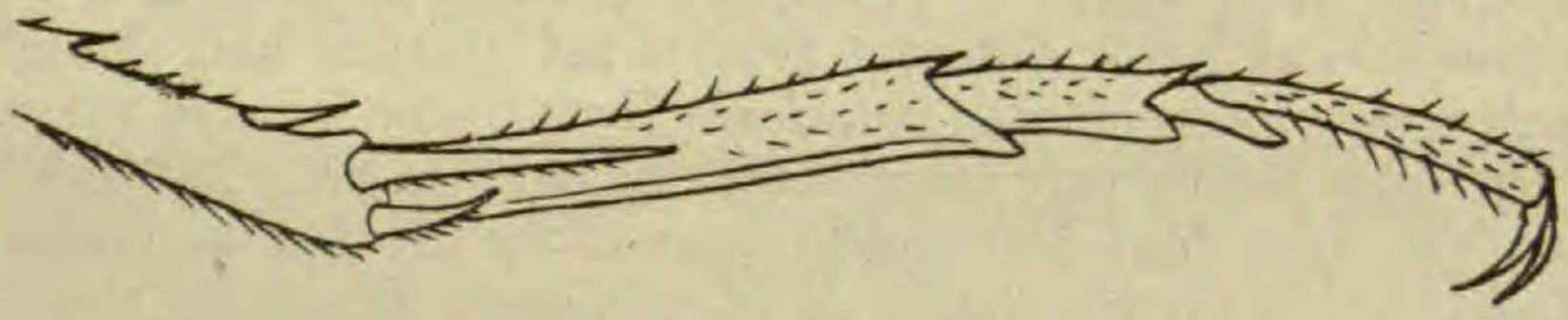

Neonetus variegatus Br.

Fig. 19.—Head and thorax, dorsal view, × 7.
Fig. 20.—Head and thorax, lateral view, × 7.
Fig. 21.—Frontal rostrum, × 14.
Fig. 22.—Apex of abdomen of male, dorsal view, × 7.
Fig. 23.—Apex of abdomen of male, lateral view, × 9.
Fig. 24.—Chitinized part of genitalia, × 14.
Fig. 25.—Apex of anterior femur, × 19.
Fig. 26.—Apex of posterior tibia and tarsus (internal face), × 14.

the clypeus. Maxillary palpi rather short, with first and second joints white, third and fourth spotted with brown, fifth whitish; fourth joint little shorter than third, fifth scarcely twice as long as fourth (1 mm., 5–1 mm., 2–2 mm.); labial palpi whitish. Eyes rather large, much rounded posteriorly, situated behind the antennae near the top of head; ocellary spots very near the base of the rostrum. Antennae rufous, about three times as long as the body, showing from place to place a few lighter rings; first joints short, wide, rather distant from one another.

Pronotum with anterior and posterior margins feebly convex, lateral lobes only moderately high, their inferior margin almost straight, rounded angles; disc little convex, brown with yellowish spots, lateral lobes fuscous widely bordered with yellowish inferiorly. Mesonotum and metanotum coloured like the pronotum, with posterior margin little convex, inferior margin of lateral lobes rounded. Espisterna and epimera short, yellowish.

Abdomen brown, variegated with yellow, the tergites presenting posteriorly a darker band interrupted by light spots; first tergite presenting a large yellowish mark on each side. Inferior face of abdomen yellowish. Male: Supra-anal valve square, subgenital plate very large, ending in a long, curved, acute process; styli very long and slender, inserted near the base of the plate; cerci rather long, curved, thick at apex; genitalia presenting no real epiphallus but a small lanceolate plate, partially chitinized. Female: Tenth tergite large, truncated; supra-anal valve small, rounded; subgenital plate small, incised at apex; cerci rather short, acute at apex; ovipositor relatively short and wide, curved from the base, acute at apex, inferior valves presenting about 10 denticulations at apex, superior margin of the superior valves very finely denticulated in its apical third.

Legs marbled with brown, little pubescent; anterior and intermediate femora with 3 or 4 brown bands, armed at apex with 2 rather short but movable spines (a little longer at the intermediate femora); tibiae with 3 brown rings, armed with 2 inferior apical spurs and 2 spines on each inferior margin; posterior femora rather thick, varied with brown chiefly on their internal face, inferior margins armed with 4 spines each, apex unarmed; tibiae longer than the femora, armed on each superior margin with 20 to 25 rather regular, moderately strong spines, the last of each row apical; 4 apical spurs only, the supero-internal a little longer than half the metatarsus. All the tarsi hairy above, carinated, glabrous beneath; posterior metatarsus armed with 2 apical spines as well as the second joint.

Length of body, 12 mm.; pronotum, 3 mm.; posterior femora, 9·5 mm.; posterior tibiae, 11·5 mm.; ovipositor, 6·5 mm.

Neonetus huttoni nom. nov.

Neonetus variegatus Hutton, 1897, *Trans. N.Z. Inst.*, vol. 29, p. 236, pl. 13, 16–16*c*.

As explained above, a new name is necessary for this species, which is absolutely different from Brunner's *N. variegatus*.